SCIENCE

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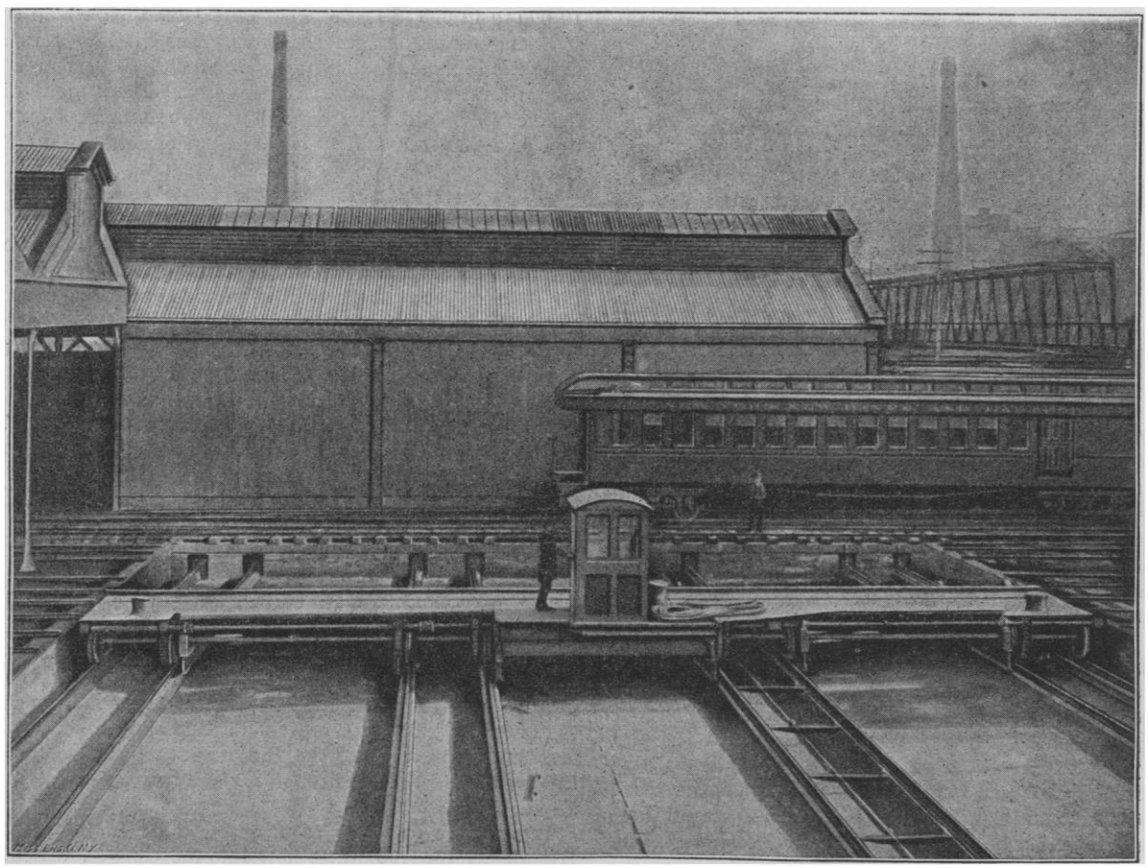
A NEW ELECTRIC TRANSFER-TABLE.

WE illustrate on this page an electric transfer-table, recently installed by the Sprague Electric Railway and Motor Company for the New York Central and Hudson River Railroad. This table differs from the earlier ones installed by the same company chiefly in the electric motor, which is of fifteen horse-power instead of seven and a half, and also in the contact arrangement. The contact is obtained from a couple of heavy copper wires stretched about three feet apart over the second of the four parallel tracks, the wire being carried on insulators fixed to light cast-iron cross-beams so as to be a few inches above the rails. The conductors are kept taut under all changes of temperature by springs at one end. Over these wires two contact rollers travel beneath the table, being kept in contact by gravity only. In the Altoona electric transfer-table, installed by the same company for the Chicago, Burlington, and Quincy Railroad, there is an outer contact maintained by springs, while at the Waukesha electric transfer-table, installed by the Sprague Company for the Wisconsin Central Railroad Company, there is an overhead contact. The current used is only 220 volts, and hence, while not wholly pleasant to take in one's body, it is in no way dangerous. The current is taken from the same dynamo that furnishes light for the station. The full current capacity of the table-motor is 60 ampères.

The speed of the electric motor is governed by a switch, which throw the winding of the field into different combinations, thus altering the current, maintaining a practically constant strength of field without the use of any wasteful resistance. The control over the speed of the motor is perfect, and no complicated nest of gearing for changing speed is required.



RAILROAD TRANSFER-TABLE OPERATED BY AN ELECTRIC MOTOR.

The motor is supported at one end, according to the regular Sprague method, by double compression springs playing upon a bolt which rests upon the platform of the transfer-table. This method has been developed in street-railway work and other places where it is desirable to start slowly under a heavy load, and has proved very satisfactory. At the other end the motor is sleeved to a rigid support. By means of this flexible

attachment, all danger of stripping the gears is eliminated, and the strain upon the gears is always a progressive one.

The advantages of electric power for this work are claimed to be great. The equipment is very much lighter than if steam-power were used, and there is no expense of operation when the table is not in use. One man can easily handle the table, and more conveniently and directly than with steam.

The two end capstans shown on the table are fixed. The centre one is revolved in either direction by a simple clutch-gear. It is used, of course, for working cars on to or off the table without locomotive power.

The capacity of the table is 100,000 pounds. Ordinary car-axles, bearings, and wheels are used throughout for the running gear, and the total cost of the table and motor complete was under $7,000. Its speed is about 150 feet per minute, the same as the old wire-rope table which it replaced. The old pit was lengthened somewhat, and accommodates ten tracks. The rails are carried on wooden longitudinals resting on small masonry foundation walls. The pit drains directly into the city sewers.

Electric transfer-tables have now been adopted by the Pennsylvania Railroad Company, the Philadelphia and Reading Railroad Company, the Chicago, Burlington, and Quincy Railroad Company, the Wisconsin Central Railroad Company, and other prominent corporations; and they are now recognized as an essential feature of every extensive and well-equipped railway switch-yard.

ASIA.[1]

ASIA, the birthplace of man, the mother of nations, is our theme to-night. Here are found the two great races of the world, — the Mongolian and Caucasian; here the great religions of the world had their origin, — the Jews, the Buddhists, the Christians, and Mohammedans. Here is the Pamir, the "roof of the world" or the steps to heaven, the abode of the gods; the centre of primeval tradition, as well as of modern theory regarding the primitive history of man. Here the Paradise of Adam has been most frequently located. Here is the lake from which the four rivers of the Garden of Eden diverge to the four quarters of the earth.

Beyond the Pamir, Alexander, the conqueror of the world, could not pass. Aristotle calls it the Mountain Parnassus, the greatest of all that exist towards the winter sunset, — the great snow mountains, which, in the morning and evening vapors, rise up opposite one like gem spires. This wonderful mountain-range is a series of high plateaus, running nearly north and south about 400 miles, and from 100 to 250 miles in width. These plateaus are covered with snow for nine months of the year. The lowest passes from east to west are from 12,000 to 15,000 feet in height, while all along the range numerous snow-peaks rise to 20,000 and even to 25,000 feet. The plateaus are inhabited only in the summer season, when the shepherds from Afghanistan and Turkestan on the west, and from China on the east, feed their flocks on the rich herbage.

The Pamir has been crossed at different times within the past five hundred years. Marco Polo was one of the early travellers; Bonvalot, a French traveller, one of the latest. Bonvalot chose the months of March and April to cross the Pamir, because there were no herdsmen to obstruct his progress. Many explorers have lost their lives in these wild inhospitable passes, and among the shepherds, more wild and inhospitable than the country.

From the Pamir high mountain-ranges run north-east, east, south-east, and south-west. From the north-east the Thian-Shan and Altai ranges of mountains run in an easterly and north-easterly direction for nearly 3,000 miles, separating Siberia from Mongolia. From Mongolia the range runs more northerly, passing through the eastern part of Siberia, forming the great divide between the waters of the Arctic and Pacific Oceans.

In Kamtchatka the mountains of the range become volcanic, and are met by a range of volcanoes from Alaska. The combined range then turns and runs south, through Japan and the Philippine Islands, into Borneo. In this chain, miles in length, is the largest number of active volcanoes in the world.

From the middle of the Pamir the Kuen-lun Mountains run in an easterly direction 2,700 miles. They separate Mongolia from Thibet. From the central part of the Kuen-lun range, cross-ranges of mountains run southerly through Thibet, past the Himalayas, into and through the peninsula of Indo-China. In Thibet these cross-ridges maintain a normal elevation of 12,000 feet, with occasional passes nearly 17,000 feet high. From the south-east of the Pamir the Himalayas run in a continuous curve about 1,500 miles, with a width of 200 miles, separating Thibet from India. They are rightly named the "Abode of Snow," for through their entire length a mean elevation of 18,000 feet is maintained. Forty peaks have been measured which exceed 24,000 feet in height, while a few range from 26,000 to 29,000 feet. From the south-west of the Pamir the Hindu-Kush extend in a westerly and south-westerly direction through Afghanistan (with many peaks over 20,000 feet in height), connecting with other ranges which form the boundary between Persia and Turkestan, to the Caspian Sea; then around the south end of the Caspian Sea, culminating in Mount Ararat. A continuation of this range crosses Asia Minor to the southern coast of the Black Sea, and thence to the Bosporus.

These ranges of mountains radiating from the Pamir are 10,000 to 12,000 miles in length. Along their whole course are snow-mountains and great glaciers. The Himalayas are supposed to be the highest mountains in the world, though none of these ranges have been thoroughly explored. These mountains, and the elevated plateaus on their sides, give Asia an average elevation of 1,650 feet, much higher than either of the other continents.

The Rivers of Asia.

These great chains are the source of the great rivers of Asia. In Siberia are the Irtish, Obi, Yenesei, and Lena. The Yenesei traverses in Siberia a territory which corresponds in length to the distance between the Gulf of Mexico and Lake Winnipeg.

The Amur is the only river of northern Asia that does not empty into the Arctic Ocean. Its general course is east; but, on passing wholly into Siberia, it turns and runs to the north, where its mouth is in inhospitable regions.

In China are the Hoang-Ho and the Yang-tse-kiang. They rise in the plateau of Thibet, near the Pamir. A great range of mountains running north and south obstructs their course, through which they force their way, and flow in an easterly direction, and empty into the Pacific Ocean; while the rivers of Indo-China, which rise in the same plateau close to these rivers, flow south into the Indian Ocean.

The Indus, and its main branch the Sutlej, rise on the north-western side of the Himalayas, follow the mountains several hundred miles, then find a way through the mountains in wonderful cañons. That of the Indus is said to be 14,000 feet in depth. Near the head waters of the Indus, another great river, the Sanpoor, rises, flowing in the opposite direction, and undoubtedly running into the Brahmaputra; but no traveller has followed the Sanpoor through the wild savage regions of lower Thibet to its mouth.

The waters from the south-eastern or Indian slopes of the Himalayas for 700 miles flow into the Ganges, which, near its mouth, unites with the Brahmaputra; while the waters from the west of the Himalayas flow into the Indus and its branches. Thus these two mighty rivers collect all the waters of the Himalayas, and discharge them into the Bay of Bengal through the many shifting mouths of the Ganges, or through the Indus into the Persian Gulf.

On the western sides of the Pamir, the great rivers of Turkestan, the Jaxertes, and Oxus, or the Syr-Daria and Amu-Daria, have their source, and flow through Turkestan into the Aral Sea. Numerous rivers rise in the Hindu-Kush, and run through the valleys of Afghanistan, but none of them reach the ocean: they are lost in the salt lakes or in the desert. The Tigris and Euphrates rise in the mountains on the coast of the Black Sea, run

[1] Address delivered before the Geographic Society, Washington, D.C., Feb. 26, by its president, Hon. Gardiner G. Hubbard.

An edition of this address, with numerous additions, will be published in pamphlet form at an early date.

through the ancient plains of Mesopotamia, by the ruins of Babylon and Nineveh, and empty into the Persian Gulf.

The Great Basins of Asia.

The several ranges of mountains enclose great basins, and the streams and rivers that flow into these basins have no outlet into the ocean, but empty into lakes or are absorbed by the desert.

There are three great basins, — the Aral-Caspian, the Balkash, and the Tarim, — and many smaller, six million square miles in extent, or more than all Europe. The Aral-Caspian includes the whole of Turkestan, the eastern half of Russia, and the western portion of Siberia. The lowest point is the Caspian Sea, about 80 feet below the level of the Black Sea. The Aral Sea is a little over 200 feet above the Caspian. Into these seas the Volga, Syr-Daria, and Amu-Daria empty, and a few other streams. The Balkash depression lies to the north-east of the Aral-Caspian, and is separated from it only by a low divide. The Tarim depression is east of Turkestan, on the other side of the Pamir.

These rivers, lakes, and seas were formerly much larger than at present. The lower course of the streams that fed them are traced only by their dry beds. The rivers flow in diminished channels into the lakes, or are lost in the desert. All these streams and rivers carry mud and gravel from the mountains, which are deposited in the lakes; and they become shallow, and broaden. As the lake shoals, the stream that runs into it broadens, the evaporation is greater, and more of the water is absorbed by the desert. If the evaporation is greater than the rainfall and inflow, as in the Caspian Sea and Lake Lob Nor, the sea will eventually be filled. Lake Lob Nor has already become nearly dry, and the Caspian Sea is much shallower than formerly.

The seas and lakes now salt were once fresh. All river-water holds salt in solution, which is deposited in the lakes which have no outlet. The fresh water, being lighter, is evaporated, and the lake gradually becomes salt.

The Aral-Caspian basin was formerly filled with a dense population. This region Attila ruled. Here he raised his armies of Huns, which overran all south-eastern Europe, Italy, and even France. Tradition tells us of large cities; and travellers, of their ruins, half buried in the sand, and of traces of numerous irrigating-canals. It was called the "Garden of the World." For hundreds of miles a nightingale could fly from branch to branch of the fruit-trees, and a cat walk from wall to wall and from housetop to housetop.

War, and the pestilence that follows, have devastated the land, for nowhere in the world have so many fallen by the sword as in Asia, while the destruction of the irrigating-canals has reduced this once fruitful land to barrenness. The Balkash and Tarim basins resemble the Aral-Caspian. In the valleys of the Balkash and Tarim, where was formerly a large population, now

> "Mere sluggish leagues of great black morass,
> Without a shrub, or tree, or blade of grass."

Grand Divisions of Asia.

These great mountain-ranges of Asia are not only the source of the rivers, but they also separate Asia into several natural divisions. The principal are Siberia, Mongolia, China, Indo-China, India, Afghanistan, Persia, Turkestan, and Turkey in Asia, each with peculiar features caused principally by its mountain-ranges and rivers, for these fix the occupation and character of the inhabitants.

Siberia.

The whole of north-western and northern Asia is called Siberia. It stretches from the Ural Mountains east over 4,200 miles to Bering Strait, and from Mongolia north to the Arctic Ocean 2,000 miles, and forms one country, alike in all its natural features. It is separated from the rest of Asia by the Balkash depression, the Thian-Shan and Altai Mountains. The general trend of the country is towards the north. Siberia has the most extensive but least serviceable water system of any country in the world. All its rivers except the Amur rise in plateaus 5,000 feet above the sea, and, flowing north, empty into the Arctic Ocean. On either side of these rivers, large tributaries flow in an easterly and westerly direction, thus affording an almost uninterrupted water highway from the Ural Mountains to the Pacific, and from the south to the Arctic Ocean. From the river Ural east to the river Lena, 2,500 miles, this magnificent waterway is only broken by two or three short portages; and through these, Russians are now constructing canals. A zone of rich black earth runs through south-western Siberia, not in mere patches of fertile land, but prairies covering 25,000,000 acres, sufficient to support millions of inhabitants. These prairies, with but little labor or expense in cultivation, yield year by year the most abundant crops. Vast flocks of birds of many species fly from all parts of Asia — from the islands of the Indian Ocean, from southern Europe and northern Africa — to breed in Siberia. A few of these species extend their flight even to the Arctic Circle.

The northern coast of Siberia is a low plain, the rainfall is much greater than the evaporation, the rivers overflow their banks, and the whole country for four thousand miles in length and three hundred miles in breadth is a great bog called the Tundra. On these plains the ground remains frozen the greater part of the year to a depth of several hundred feet. In midsummer the ground thaws about one foot in depth, and the top of this ice bed is covered with moss and lichens and many varieties of flowers. Under the lichens are found miniature pine-forests one or two hundred years old, — the beginning of a coniferous region which extends from the Ural east to the neighborhood of the Sea of Okhotsk 2,400 miles, and from the 58th to the 70th parallel of north latitude, 600 miles far north of the Arctic Circle.

In some parts of the Tundra an earth stratum alternates with a stratum of ice; and in these, carcasses of elephants and rhinoceroses have been preserved for thousands of years, and the trunks of large trees with their roots bedded in the ice. In this dreary, uninhabitable land, ice-bound for nine months of the year, exposed to the fury of the fierce gales of the Arctic Ocean, De Long lost his life. In summer the mercury rises to 102°, and falls from November to February to —40°. No other region can show such extremes. "It is colder than the north pole and hotter than the equator."

With rich lands and rivers navigable for thousands of miles, Siberia is capable of supporting an immense population. Unfortunately the only outlet for its commerce and produce is through the Arctic Ocean, and thus far all efforts to open this way have been unsuccessful.

Chinese Empire.

The Empire of China lies to the east of the Pamir, and is bounded on the north by the Thian-Shan, on the east by the Pacific Ocean, on the south by the Himalayas. It is divided into three great natural divisions, — Mongolia, Thibet, and China proper.

Mongolia.

Mongolia is bounded on the east by the Pamir, on the north by the Thian-Shan, and on the south by the Kuen-lun. Mongolia is divided into western Mongolia — called sometimes eastern Turkestan, but more properly the Tarim — and eastern Mongolia, or the Gobi Desert.

The region that gives birth to the Tarim River is on a scale of grandeur such as no other river can boast. It is girt round by a wide amphitheatre of the loftiest and grandest mountains, rising in ridges of from 18,000 to 20,000 feet, while the peaks shoot up to 25,000, or even 28,000 feet. From all sides the waters rush headlong into the valley. The smallest disappear in the sand; others flow some distance into salt basins, and are there absorbed. Sixty streams, according to the Chinese, unite to form the Tarim. Along the foot of the mountains are fruitful oases, irrigating-canals, and flourishing towns and cities.

The Tarim steadily diminishes until, after flowing over a thousand miles, it broadens into an extensive reedy marsh, known from ancient times as Lob Nor, or the salt lake. When the land was well cultivated, the mild south winds which brought the sands from the desert were eagerly looked for, as they brought

richness and fertility to the soil; but with the decrease of population the sand drifted over the cultivated fields, and now covers them to the depth of six to twelve inches. Prjevalsky describes the "lake-dwellers of Lob Nor:" "Their food consists chiefly of fish, fresh in summer, dried in winter. They eat neither bread nor meat on account of its scarcity." The people are changed so little from the picture history has given of them, that Prjevalsky's description sounds like an echo of the most ancient Chinese records.

The eastern part of Mongolia is the Desert of Gobi or Hanka ("a dry sea"). It is a rocky, desolate region, with wells and small oases scattered through it. The routes across the desert follow the lines of the wells. Marco Polo says it would take a year or more to ride from one end of it to the other.

The Mongolian of to-day is the living representative and descendant of the ancient Huns and the more ancient Scythians. From Mongolia came the vast hordes that overran Asia and Europe. Their greatest leaders were Genghis Khan and Tamerlane.

In the twelfth century Genghis Khan conquered the eastern part of Asia and Turkestan. Two hundred years after him came Tamerlane, the last of the great conquerors, who carried his conquests into Persia and India, and even into Europe. They boasted that the grass never grew where the feet of their horses had trod, and that a horse might run without stumbling over the places where great cities had stood. The Mongols were powerful only under their great leaders. As soon as the despotic rule was withdrawn, they were broken up into separate families and tribes. To restrain the Mongols, the Chinese Wall was built; but it did not prevent them from conquering China and ascending the throne.

The Pamir, with the Himalayas on the south and the Thian-Shan on the north, forms an impassable barrier between eastern and western Asia. But some 300 or 400 miles north of the Pamir there are three valleys near the 46th parallel of latitude, which afford the only accessible route. Through these valleys caravans go from China to Russia; and for hundreds of years the great hordes of Huns, Mongols, and Tartars poured through these passes into the fertile valleys of Turkestan, forcing the inhabitants of those regions into Europe.

Thibet.

The southern part of the high plateau of Asia is called Thibet. It is bounded on the east by the Pamir, north by the Kuen-lun Mountains, and south by the Himalayas. It is the highest plateau in the world. At the Pamir its elevation is about 15,000 feet, falling to 11,000 feet at its eastern side. Snow-clad mountains shut it in on every side, and cut it off from the rest of the world. It is a cold, rocky country, dry and barren, hardly affording nourishment to its scanty population. The people are poor, and peculiar as their land. The men are unable to maintain separate families, and one wife suffices for two or three brothers. Here, as in a few other poor countries, polyandry is practised, the surplus females being sustained at public expense in the nunneries. The French-Catholic missionaries in Thibet tell us that the population is about 4,000,000; that the mountains run through the country from west to east, with deep valleys or cañons between them.

Gold is found in most of the rivers, and there are also mines of gold, silver, and copper. The government is a despotism. We are told that one of the early rulers of Thibet ordered an equal distribution of property among all the people; but the property was soon in the possession of the former owners, while the poor were poorer than ever. This experiment was repeated three times with similar results.

China.

China is situated east of Thibet. The lands trend toward the east, the high mountains of Thibet become lower, and from the foot-hills low plains extend to the Pacific Ocean.

The population of China is 400,000,000,—more than one-fourth of the world. The number of inhabitants to the square mile is greater than in any other country. This vast population is supported by the two great rivers, the Hoang-Ho and Yang-tse-kiang, which run through the whole length of China, and by the great tracts of rich yellow earth called loess. The land is highly cultivated, and well watered by irrigating-canals, which carry the water of the rivers to all parts of the country. The loess is a solid but friable earth of a brownish-yellow color, and spreads alike over high and low lands, extending over a tract of country larger than France, and, whether on a plain or at an elevation of 7,000 or 8,000 feet, is available for agricultural pursuits. This region is called Hoang-Lu (or "Yellow Land"); and the river that runs through it, Hoang-Ho (or "Yellow River"). Its origin and constituent parts have long been a subject of inquiry. Richthofen, and our own Pumpelly, describe the loess as hundreds and even thousands of feet in thickness, an almost impalpable calcareous and silicious loam, so soft as to be easily crushed in the hand; and yet its consistency is such that it will support itself for many years in vertical cliffs 200 feet high. These plains have been cultivated for four thousand years by irrigation, without requiring any fertilizer.

Richthofen believes that the loess was a sub-aerial deposit without the intervention of water. The products of disintegration from the mountains and steppes, instead of being carried seaward, were blown from the hills into the valleys of a treeless continent. Grass and heather grew, only to be covered again and again by the deposits. This covering nourished the new vegetation, while the decay of the old produced the capillary tubes which give to this material its vertical structure and strength. An immense quantity of land-snails and the bones of land-animals have been discovered in the loess, but no traces of marine or fresh-water life.

Great perpendicular cliffs rise in many places 500 feet in height. In these cliffs caves have been dug in which it is said several millions of people live. The same formation is found in some parts of Europe and in the Mississippi valley, and was formerly supposed to have been a sub-aerial deposit; but three of our geologists in different localities followed the beds of loess to their source in the terminal moraines of ancient glaciers, and proved that the loess is the fine white dust or powder produced by the grinding of the glaciers over the ground, which has been carried down by the streams. Some of our ablest geologists believe the loess of China was formed in a similar way.

Japan.

Japan consists of four large and four thousand small islands. It extends from the Sea of Okhotsk 1,800 miles to the southern part of Corea. The Gulf Stream of the Pacific bathes the south-eastern coast of Japan, and there the climate is warm and equable. The north coast is cold and disagreeable, the wind blowing from Siberia and the cold waters of the Arctic Ocean, which gives to this part of Japan a climate more like that of northern America than that of Europe in the same latitudes.

A chain of volcanic mountains runs the whole length of Japan, and occupies seven-tenths of the islands. There are no rivers, but many torrents rush down from the mountains in the wet season and after every storm. The earliest inhabitants of Japan were the Ainos, who at that time probably occupied all the islands. As a race, they are inferior to the Japanese. They are gradually retiring before their superior civilization, and are now confined to the remote districts, where they live by hunting and fishing. The Japanese are of the Mongolian type, resembling the Coreans and the former inhabitants of Siberia rather than the Chinese. Their early civilization seems to have come from Corea.

In some parts of the islands they have intermarried with the Ainos, while in the southern portions there are traces of the Polynesian race. Formerly and for many centuries the Mikado ruled with despotic power; but in the seventh century the Shoguns, or military rulers, seized the control, and held it until 1868, when they were deposed by the people and the Mikado restored, but with only a portion of his former power. At that time, after a sleep of centuries, Japan awoke in a day, and, independent of outside influences, threw off the rule of the old oligarchy, established a government largely representative in its

institutions, and inaugurated a free national assembly, to meet for the first time this year.

The visit of Admiral Perry shortly after the deposition of the Shoguns introduced Japan to the civilized world. Instructors in the arts and sciences were obtained from America and Europe. Their young men were sent to our institutions, and on their return replaced foreign teachers. Post-offices were established, highways and railroads constructed. A new era, unheard of in the history of the world, has dawned upon Japan, and its progress is watched with the greatest interest.

There are few domestic animals in Japan. The horse is little known, and travelling for long or short distances is in a jinrikisha. This vehicle, introduced by the Americans within twenty years, is drawn by the natives forty or fifty miles a day.

The beautiful art of Japan is well known to us. Its bronzes and metal-work, its pottery and porcelain, are our admiration. Unfortunately, to meet the demands of foreign markets, the art of Japan is deteriorating, and the painstaking and loving labor of past centuries is giving place to coarser and rapid work.

The Peninsula of Indo-China and India.

South of the Pamir, its south-eastern and south-western ranges of mountains, the Himalayas and Hindu-Kush, Asia throws out two great peninsulas—Indo-China or Malay, and India—extending south to the equator. Indo-China or Siam is about 1,800 miles long, 700 miles wide at the north, sloping away to a little over 60 miles at the south. Through this peninsula four great rivers, rising in the northern part of Thibet, flow in long narrow valleys between ranges of high mountains. The rainfall is from 60 to 200 inches, the rivers are ever full, the climate is moist and unhealthy for foreigners. The soil is rich, producing abundantly all tropical products.

India.

In India the great rivers that flow from the Himalayas, instead of running the whole length of the peninsula as in Indo-China, are turned to the east and west by ranges of mountains that cross India near the central part. These ranges run to the ocean, and then follow both the eastern and western shores into Ceylon. The land is rich and fertile, the people industrious. The cultivation of tea and grain for export has recently been introduced into India, and now more tea is imported into England from India than from China, while its grain competes with the grain from America in the London markets.

Nothing is more remarkable in the history of our race than the manner in which the ancient civilization of India has maintained itself. Before the time to which the annals of Europe go back, India had made great material and intellectual advancement; the character of its inhabitants became fixed; and, though subjected to greater changes and vicissitudes than have happened to any other country, they have remained substantially the same that they were two thousand or three thousand years ago. They have been under rulers of different races, though generally of the same religion, with like customs and manners. The population of India is 250,000,000, or about one-sixth of the population of the world.

While portions of Asia are among the driest regions of the earth, the peninsulas of Indo-China and India are among the wettest; for in some parts of upper India the rainfall is from 400 to 600 inches a year, or from 33 feet to 50 feet.

Afghanistan, Persia, and Arabia.

South-east of the Pamir are Afghanistan, Persia, and Arabia. I class them together for convenience, because they have several physical features in common. Through Afghanistan, the Switzerland of Asia, ranges of mountains run in different directions. The country is generally well watered with numerous rivers, though not one of them empties into the ocean. The valleys are rich and fertile. Its inhabitants, unlike those of India and Persia, have rarely been conquered. They are free and independent, robbing each other and the neighboring nations.

In Persia, or (as it is called by the Persians) Iran, the Iranians or Caucasians and Turcomans or Mongols met three thousand years ago, and the races to-day are as distinct as then. The Iranians inhabit eastern Iran; the Turcomans, western.

Iran was formerly much larger than at present, and was bounded on the north by the Caspian Sea, by the Indian Caucasus, Paropamis separating it from Scythia or Turkestan; on the east by the Indus; south by the Indian Ocean; and west by the Persian Gulf. It included Mesopotamia, Persia, Afghanistan, and Beloochistan.

The whole of Iran is either mountainous or a high plateau, excepting Mesopotamia, the coast of the Caspian Sea, and a few of the valleys of the interior basins, which are very rich and fertile. The rainfall is very slight, not over ten inches. There are a few great salt deserts, "covered in winter with brine, and in the summer with a thick coat of salt." The country has been described as either a "salt waste or a saltless waste." One-half the entire drainage is into the salt basins.

There is but one considerable river east of Mesopotamia that empties into the ocean. A few run into the basins, and empty into the salt lakes.

From Karachi, on the Persian Gulf near the mouth of the Indus, to Teheran in the northern part of Persia, nearly one thousand miles, there is not a single stream more than two feet deep.

Persia, even when densely populated, was no better watered than now, for a comparison of the ancient and modern maps does not show any change in the river system. The sand has in many places drifted over land formerly highly cultivated. A perpetual struggle for the mastery seems to be going on between the arable tracts and shifting sands, and the country is changing from a series of rocky ridges to one of undulating sandy wastes.

There are only one or two good roads of short length in Iran. The whole traffic is carried on by mules in the mountains, and camels on the plains, "no wheeled carriages existing."

The higher plateaus are barren, but Mesopotamia and the shores of the Caspian are very fertile; and near here, on the southern coast of the Caspian Sea, was the geographical centre of the eastern continent. It was formerly the centre of population; but, after the destruction of the Medes and Persians, the geographical centre moved eastward to the southern plateau of Thibet; but with the growth of Europe, the centre of population is moving westward.

Persia was for centuries the centre of civilization and the great power of the world. During a period of two thousand years before the Christian era, its great cities of Babylon, Nineveh, Ecbatana, Persepolis, and Susa rose, flourished, and fell. These cities were the wonder of the Old World, and their ruins are still the wonder of the New. In vast extent, in the magnificence of their temples and palaces, in the strength of their walls, in their great water-supplies, they have never been equalled.

This mighty empire was composed of many tribes and many races, held together for centuries by the power of its rulers, Cyrus, Darius, Xerxes, and others. At the time of its conquest by Alexander the Great, it stretched from the Desert of Sahara to the mountains of the Pamir; but under his successors it fell into pieces, and was never again united under one rule; and for two thousand years Persia has been gradually declining in power, influence, and population. It has lost Mesopotamia on the west, Afghanistan and Beloochistan on the east, and a part of Turkestan on the north. The present Shah of Persia has three times visited Europe. Since his last visit he has determined to inaugurate reforms in his government. His power over his people is absolute; but, should his desired reforms seem inconsistent with the sacred laws of the Koran, he may be at any time deposed.

He has granted a charter to Englishmen for an imperial bank, giving not only banking privileges, including the right to issue paper money as a legal tender, but also the monopoly of all mines save those of gold and silver.

The Persians are by nature traders and artists. Persian merchants are met with everywhere in the Old World,—in the bazaars of Cairo, Constantinople, and Damascus; at the fair of Nijni Novgorod; in Rome and Paris. The Parsees, the leading merchants of Bombay, are the descendants of the ancient Perses, and are still worshippers of fire.

In Arabia, as in Persia, mountains follow the line of the coast, and rise from the Red and Arabian Seas and from the Persian Gulf, making the whole interior of Arabia an elevated plateau, —a desert but little known, and with few inhabitants. Such is the dearth of running water, that in the whole of Arabia there is not a single perennial stream. If there is any country which has seemed to lie completely outside the stream of ancient history, it is Arabia. In spite of its vast extent; in spite, too, of its position in the very centre of the civilized empires of the ancient East, midway between Egypt, Babylon, and India,— its history has been almost a blank. For a brief moment, indeed, it played a conspicuous part in human affairs, inspiring the Koran of Mohammed, and forging the sword of his followers; then the veil which had covered it for untold centuries was drawn over it again. Yet modern research tells us that culture and civilization existed there, of which only echoes remain in Mohammedan traditions. Three thousand years ago it was easier to travel through the length of Arabia than it is to-day. It was formerly supposed that our numeral system was devised by the Arabians. Later research shows that it had its origin in India, but came to Europe through the Arabians.

Asiatic Turkey.

Asia Minor, Armenia, Koordistan, Mesopotamia, and Syria form the remnant of the Turkish Empire in Asia, misgoverned, and sustained only by the sufferance of the European powers and the fear of Russia.

Much of the land is rich and fertile, and capable of supporting a large population; but, under the misrule of the Turks, some portions have become depopulated, and it is steadily diminishing in population.

Asia Minor is a peninsula connecting south-western Asia with Europe, and bounded by the Black Sea on the north, and Mediterranean on the south and west. A range of mountains runs round the coast, and portions of the interior are a desert. Miletus, the ancient metropolis, was twenty-five centuries ago the chief centre of geographical studies, and here the earliest known charts were planned. The capital of Asia Minor is Smyrna, which has a large trade with Europe.

The population is composed of Greeks and Turks. The Turks are an indolent, self-indulgent race, while the shrewd and active Greeks are the merchants, lawyers, and bankers of the country, and are steadily supplanting the Turks.

Armenia is a mountainous country. In the south-eastern corner is Mount Ararat, 17,000 feet in height. Here Turkey, Persia, and Russia meet.

Lake Van, a large and beautiful salt lake, lies on the borderline of Armenia and Koordistan. It is on an elevated plateau, nearly 6,000 feet above the sea-level. It is the only lake of Asia which is steadily increasing in size.

The Armenians are nominally Christians,—shrewd businessmen. They are great travellers, and thousands seek employment in Constantinople and foreign cities. Their numbers are steadily decreasing.

The Kurds are shepherds, inhospitable and warlike, and robbery is with them an honorable occupation.

Syria will ever be revered as the Holy Land. Pilgrims from every quarter of the world visit the river Jordan, the Sea of Galilee, and Jerusalem.

The valley of the Jordan, and its mouth, the Dead Sea, are the deepest valleys in the world. At the Sea of Galilee the Jordan is 600 feet below the level of the Mediterranean. The valley grows deeper until at the Dead Sea it is 1,300 feet below the level of the Mediterranean.

Turkestan.

West and north-west of the Pamir, and north of Persia, is Turkestan. The trend of the country is from the high lands of the Pamir, west to the Aral and Caspian Seas.

Here is the Aral-Caspian basin, already described. The whole of this country, excepting on the banks of the rivers and a few oases, is a great desert. A recent French traveller says it is a dismal region, where all vegetable and animal life ceases,— the domain of death; formerly densely populated, now inhabited by wandering tribes of Turcomans, until their recent conquest by the Russians living by pillaging each other, or occasionally uniting for incursions into Persia.

From this summary it will be seen, that, while two-thirds of the population of the world is in Asia, only about one-fifth of its area is thickly inhabited. Much the largest part is a desert. Beginning in eastern Mongolia, almost within sight of the Pacific Ocean, this desert runs through Mongolia and Thibet, crosses the Pamir, to appear again in Turkestan and Persia.

It occupies all Arabia. The Red Sea does not stop it; for on the other side the Desert of Sahara begins, and only stops when it reaches the Atlantic Ocean,— a desert extending from the Pacific to the Atlantic, across Asia and Africa.

The earliest civilization of Asia was in Mesopotamia. Its authentic annals are over four thousand years old. Here the proud empires of the Old World—Chaldea, Assyria, Babylon, and Persia—rose and fell. Here stood the ancient cities of Nineveh, Babylon, and Bagdad.

Now the traveller finds only ruins, and scarce inhabitants sufficient to aid in the explorations. The Tigris and Euphrates run through the whole length of the country, and are both navigable several hundred miles from their mouths. The waters of the Euphrates rise within 80 miles of the Mediterranean. The valley of the Euphrates was the great trade-route of the ancients, and the English have made surveys for a railroad through it.

The Commerce of Asia.

The commerce of Asia has for four thousand years given wealth and power to the cities and countries that have monopolized it. The men of Tyre and Sidon, the seaports of Phœnicia, were once the merchant princes of the world. They gave to the Greeks their alphabet, their weights and measures, and their ships. They established colonies all along the coast of the Mediterranean. They traversed all the known seas, and circumnavigated Africa six hundred years before the Christian era. They brought the gold and silver of Tarshish from Spain, tin and copper from England, and carried the products of India and Babylon to every part of the world. After the conquest and decay of Tyre and Sidon, the commerce of Asia passed to Greece, and from Greece to Rome.

The Grecians introduced new methods of exchange, and developed a true coinage where the dealers of Tyre and Sidon had been confined to a cumbrous system of barter.

In the middle ages, Venice and Genoa sent their ships to every part of the Mediterranean. They founded colonies in Asia Minor and in the Crimea. They controlled the commerce of Asia; and its wealth poured into these cities, making them the richest in the world. It was the commerce of India that Columbus sought in his Western voyage; but where Columbus failed, the Portuguese succeeded, by sailing around the Cape of Good Hope, and thence north to India. For a short period Portugal was the richest country of Europe.

The ships of England and Amsterdam quickly followed this new route, and the commerce and lands of the Orient passed into their control.

But again the route changes. The Suez Canal was built by the French, notwithstanding the opposition of the English. The canal was opened by the Emperor of France, but it was English steamers that used it. England obtained a controlling interest in the canal, and further strengthened its hold by acquiring at first joint control with the French in Egypt, and then the exclusive control, and for a time secured the canal, and with it the commerce of Asia.

The French, Italians, and Austrians found it cheaper to bring the products of Asia to Marseilles, Venice, and Trieste than to buy them in London; and their steamers now sail through the canal to India and China. They have obtained a small but daily increasing share of the commerce of Asia, formerly monopolized by England.

A few years ago, Russia crossed the Caspian, and was defeated by the Turcomans. To aid them in the second campaign, the rails and materials collected in the Crimea for a railroad across

the Balkash to Constantinople were transferred to the eastern side of the Caspian Sea, and a railroad built east across the desert.

After the conquest of the Turcomans, difficulties arose between Russia, Afghanistan, and England, and the railroad was continued in a south-easterly direction towards Herat and India. When the Afghanistan boundary was settled, the line of the railroad was turned to the north-east. It was carried through Merv, across the Oxus to Bokhara and Samarcand, nine hundred miles from the Caspian.

The railroad runs for two hundred miles along the foot of the mountains, separating Turkestan from Persia. All the mountain-passes in Persia are controlled by the Russians; and Russian products are taking the place of English in the markets of northern Persia, Turkestan, Afghanistan, and even Thibet. The influence of Russia in Persia is to-day paramount to that of Great Britain.

France was formerly a competitor with England for the Empire of India. Defeated there, she has built up for herself a principality in Cambodia, Anam, and Tonquin.

The Future of Asia.

England has successfully met and stopped the progress of Russia in Europe, but in vain has she opposed her in Asia.

Only a few years ago Russia was bounded on the south and east by the Caspian Sea: now her outposts are one thousand miles east of the Caspian, bounded by the Pamir and China, and only Afghanistan separates her from India and the English Empire. They will soon meet among the mountains of Afghanistan as friends or foes. These nations from either extremity of Europe are neighbors in Asia, but are as far apart as the poles in their methods of dealing with conquered Asia.

The Russians are Asiatic in their origin, and easily adapt themselves to Oriental customs and manners. Their conquest of Asia is a conquest of Orientals by Orientals. After a sojourn in civilized Europe, they return as colonists, as merchants, as inhabitants, where they soon become acclimated. The expansion of Russia in Asia is the natural growth of the parent stem.

The English are mere sojourners in Asia as officials for a longer or shorter term of years. Every Englishman yearns for the expiration of this contract, and for his English home. The English are of a race entirely foreign, never becoming one with a conquered people, but widely separated in interest, thought, and habit. They instruct the people, send missionaries to them, build railroads and irrigating-canals, substitute low and regular taxation for irregular and exorbitant exactions of all kinds, yet in every act and deed they are conquerors, and not inhabitants.

The climate of India presents an insurmountable obstacle to the English, and renders English colonies an impossibility. The expansion of England in Asia is like a graft on an uncongenial stem.

Whether England will maintain her sway in India, notwithstanding all she has done for the prosperity of the country, is a question which Englishmen are discussing. The English are hated by the Hindoos, and it is said even by Englishmen that India would prefer the lawlessness of their old rulers to the order and rule of England.

Long before the mariner's compass or the invention of gunpowder in Europe, canals were in use in China. For hundreds of years they have intersected the country. Centuries ago they had made great progress in civilization; but then they came to a stand-still, beyond which they have only recently advanced. For many years the more advanced and intelligent Chinese have tried to introduce telegraphs and railroads into China, without success. But now the party of progress has prevailed, Chinese steamboats crowd the inland seas and rivers, and a railroad will soon be built from Peking, through Nankin, to China Kiang, 600 miles, crossing the two great rivers of China, the Hoang-Ho and the Yang-tse-kiang, following the line of the Imperial Canal. French, German, and American engineers are waiting at Ticutsin to take the contract, but it will be undertaken and completed by the Chinese.

Until recently, the carrying trade between the seaports of China, and the commerce between China and Europe, were in the hands of English and American merchants; but the Chinese have bought or driven off the foreign steamers and taken the business, and now only one English and one American house remain. The Mandarins have recently opened a large depot in London to sell their teas and silks. China has awakened from her long sleep, and has entered on a new course. Her emigrants are found in the islands of the Pacific, and are only stopped by our laws from passing the Pacific Ocean and possessing the western coast of America. China, like Japan, has awakened from the sleep of centuries to a new and higher life.

Europeans have taken possession of the whole continent of America, and have exterminated the aborigines. Not content with America, the Europeans have surrounded Africa with a fringe of white settlements. They have occupied the valley of the Kongo, have worked their way from the Cape of Good Hope north towards the centre of Africa, from Zanzibar west to the Great Lakes, and from Algeria south towards Timbuctoo. The English have taken possession of Australia and New Zealand, and the natives are disappearing as rapidly as they disappeared from America. Over all the islands of the Pacific the flags of European nations wave.

All the northern and western portions of Asia are under Russian rule. Persia and Afghanistan are neutral; Russian influence predominating in Persia, English in Afghanistan. The Queen of England, the Empress of India, has extended her empire over Burmah and the Straits Settlement, down Indo-China to Singapore and the equator. East of the English are the French in Anam and Tonquin. Over the islands of Sumatra and Borneo, Holland and England rule.

There remain, then, China and Japan. Again and again foreigners have apparently succeeded in affecting an entrance into China and Japan, but as often they have failed, met by a steady, persistent, and inflexible resistance. China and Japan are the only nations in the world that have successfully resisted the encroachments of Europeans.

NOTES AND NEWS.

IT is reported from Paris that the engineers sent out to examine the condition of the Panama Canal found that only three-tenths of the necessary work has been done, and that much that has been done will have to be done over if operations are ever resumed.

—It is reported that a bridge across the Bosporus is projected by a syndicate of French capitalists. At the points elected for bridging, the channel is about half a mile wide.

—Mr. Robert Moore stated at a meeting of the St. Louis Engineers' Club, March 5, that *lignum-vitæ* ties were being used successfully in Mexico. Their cost was about a dollar each, and they lasted indefinitely.

—Among the subjects to be discussed by the International Labor Conference at Berlin are the regulation of mine-work with reference to the prohibition of the labor of women and children under ground, the shortening of the shifts in particularly unhealthy mines, the insuring of a regular output of coal by subjecting the working of the miners to international rules, the regulation of Sunday labor, and the regulation of the labor of women and children. The question whether there shall be future and periodical conferences of the same nature will also be discussed.

—The Pan-American Conference has adopted a report recommending that the governments represented give their adhesion to the treaties on literary and artistic copyright, trade-marks, and patents adopted by the South American Congress at Montevideo. These treaties, which were subscribed to by the Argentine Republic, Bolivia, Brazil, Chili, Paraguay, Peru, and Uruguay, provide that authors and inventors shall enjoy in all States the rights accorded them by the laws of the State in which the original publication or grant takes place, but that no State is obliged to recognize such rights for a longer time than that allowed in the original State. The conference also recommends the adoption of the metric system by the United States in all official business.

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

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MENTAL SCIENCE.

The Rivalry of Mental Impressions.

WHENEVER two or more impressions are presented to the mind at the same time, there results a rivalry between them in attracting the attention and getting into the focus of consciousness. Usually the attention is divided between them, though this flitting of the attention is at times so rapid and so unconscious that we hesitate to believe that it has really taken place. If the one process is automatic in character, or nearly so, the interference is reduced to a minimum. When both processes are voluntary, mutual interference is inevitable; and its extent will depend upon the complexity and other characteristics of the task, and will doubtless vary, too, with each individual. Some simple experiments in this field by M. Binet, though they hardly do more than open out the possibilities of research in this direction, may be here recounted for their general interest and suggestiveness. The subject of the experiment is asked to take hold of a rubber bulb connected by means of a tube with a recording apparatus consisting of a point raised and lowered by the air-pressure within the tube, and writing upon a smoked surface fastened to a rotating drum. He is required to press this bulb once a second, and the result is a tracing on the smoked surface showing very regular curves. With this is compared the tracing produced when at the same time he is required to perform some simple mental exercise, such as reading aloud, adding or multiplying numbers, and the like. The most usual result is that the intervals between the pressures are lengthened, with some persons only slightly, with others more noticeably; and in some cases the pressures even cease altogether for a brief period. Very frequently, too, the movements are less forcible, so that the curves are not as high as normally. Again, let the subject be told to make a series of five pressures, then allow a second's interval and begin another series of five; and so on. This is done very constantly and regularly; but, if the subject performs another task at the same time, we have, in addition to the other irregularities, an irregularity in the number of pressures in a series, sometimes only four, and sometimes six. Sometimes the interval is neglected or two pressures overlap, and in every way the mental friction and inco-ordination is shown. The pressure upon the rubber tube, in turn, interferes with the mental task, although this cannot be so accurately noted. The addition of simple numbers takes considerably longer than normally, and the result is often wrong. M. Binet notices, too, that the pressures soon get to be done subconsciously, the subject not knowing at the end of the experiment whether he has made an error, or has written irregular curves or not. The pressures thus become more or less unconscious while still remaining voluntary. It is interesting to note, that, if the pressure be done by both hands, the errors and irregularities are the same. If, for example, the one hand presses four times instead of five, while its owner is engaged in some mental task, the left, pressing at the same time, will also write four instead of five curves, thus indicating that one volition brings about both actions. The degree of interference depends upon the nature of the two tasks; and if we keep the one task the same, and vary the other, we have a kind of test of the power of an individual to do two things at once. It was found that some subjects could perform simple additions and keep up a series of two pressures in a second, but not with more than two; others could keep up as many as five in a series. But all these actions are extremely fatiguing, and some individuals refused to go on with them on account of the headaches they are apt to produce.

A different aspect of this interference is revealed when the two hands attempt to make two different movements at the same time. In all such cases there is great mutual interference, not alone because the two tasks are closely similar, and so employ allied brain-centres, but especially because the movements of the two hands are subject to a special co-ordination, and their disassociation is proportionately difficult. If one hand attempts to draw curves and the other straight lines, the curves will be somewhat straightened out, and the straight lines somewhat curved. If the one hand is to beat two beats to every five of the other, this may be done correctly for a time, but soon the two tend to beat the same number of times. If one hand attempts to write a sentence while the other draws circles, the writing and the circles will both materially suffer. All this when the two tasks are different: if the two hands make the same movement, they seem to aid each other, and especially does the preferred hand (right or left handedness) help the other.

M. Binet has studied another phase of the subject, introducing us to a quite different order of mental phenomena. If the attention, instead of being divided between the operations, is sharply concentrated upon one, we approach the case in which a person abstractedly does one thing while his attention is devoted to another, — an artificial absent-mindedness, which, as usual, implies an extreme "present-mindedness" in another direction. The subject is given something to read, and his one hand he is told not to consider at all. If the attention be sufficiently engrossed (and this can be done with only a few subjects), the hand will reproduce slight movements imparted to it by the operator in total unconsciousness of their origin. Such movements are spoken of as automatic movements. These are of a quite different character from the foregoing; for while there the two acts interfered with each other, and the more so the less intense the effort to produce them both, here the two acts do not interfere with each other, and are best performed when no conscious effort at all is made. This difference M. Binet

regards as important enough to warrant the reference of the latter to a different stratum of the personality, a different *ego*. The reason of this is, that in the case of the voluntary movements we have a mental representation of the act about to be done, and we unite its elements into a single idea. As this becomes difficult by reason of the disparity of the various acts, the evidences of mental conflict become prominent. On the other hand, in the automatic acts no mental representation is present to the mind, and therefore no conflict arises. In brief, we can do two things at a time with advantage in two quite different ways. The first is when they contribute to the same end, such as the different movements of the two hands of the pianist or the violinist, and so on; the second, when the one is done automatically and unconsciously; and both of these capabilities will vary very considerably in different persons.

M. Binet has reduced to experiment a further class of automatic reproductions. We all appreciate the tendency to beat time when listening to a lively musical production, or the unconscious adaptation of our gait to the selection of a band on the street. The same fact is shown in the case of an hysterical subject in whose hands is placed a recording dynamometer while a metronome is beating in the room. The result is an unconscious series of pressures to the time of the metronome beats.

THOUGHT AND RESPIRATION. — The experiments of Professor Leumann indicating the adaptation of the rate of reading, and possibly of other mental work, to such physiological rhythms as the respiration (v. *Science*, Nov. 22, 1889), have called forth some interesting comments upon his thesis. Attention has been directed to the analogy between this and the methods adopted by the Yogi to reach the condition of abstract contemplation and rapt ecstasy. Professor Max Müller contributes some extracts from the Sanscrit *Yoga-sûtras* describing this *prânâyâma*, or expulsion and retention of the breath for the purpose of steadying the mind. The Yogi must assume a firm and easy position, and then begin to regulate his breath. He draws it in through one nostril, pressing his finger on the other, and then, after retaining it some time, emits it through the other nostril. "All the functions of the organs being preceded by that of the breath,—there being always a correlation between breath and mind in their respective functions, — the breath, when overcome by stopping all the functions of the organs, effects the concentration of the thinking principle to one object." The time devoted to each of the three factors is regulated by so many repetitions of the syllable *om* or other mystic formula, or by turning the left hand round the left knee a given number of times. The time devoted to inspiration is the shortest, and that to the retention of the breath the longest. The operation is performed as a preparation for an abnormal mental state in which incredible powers are exemplified. The theory of the process is thus given in a commentary. "By the motion of the breath the thinking principle moves; when that motion is stopped, it becomes motionless, and the Yogi become firm as the trunk of a tree: therefore the wind should be stopped. As long as the breath remains in the body, so long it is called living. Death is the exit of that breath: therefore it should be stopped." Another writer, Mr. Ley, notices the use of deep and rapid respiration as an anæsthetic. Some dentists ask their patients to breathe quickly and fully some four or six minutes, at the end of which the patient becomes giddy, to some extent loses consciousness, and a short operation may be painlessly performed. While in this condition, the patient has no power to move his arms, but will open his mouth at the bidding of the dentist (v. *Nature*, Feb. 6, 1890).

HEALTH MATTERS.

THE ORIGIN OF FEVER.—M. Roussy, in a paper read before the French Academy of Medicine by M. Schutzemberger, states that fever is often the result of soluble non-organic principles, but of microbian origin, being introduced into the animal economy. He has ascertained, according to the *British Medical Journal*, that injecting into the blood or under the skin water in which different organic matter has been macerated also determines a febrile condition. M. Roussy has isolated the pyrexogenic element, and concludes from the results of his experiments that certain diastasis or zymosis (soluble ferments) have a febrile influence: the water in which the yeast of beer has been macerated is an instance. M. Roussy used the same method as M. Berthelot for obtaining "invertine," and it is possible that the body discovered by M. Roussy is identical with the invertine.

EUROPEAN INFANTILE MORTALITY.—We learn from the *Medical Record* that a comparative study of infant mortality in different European countries has been made by Dr. Fodar, with the following results: of 1,000 children born alive, 106.3 die during the first year in Norway, 137.1 in Sweden, 154 in England, 169.1 in France, 217.7 in Prussia, 220.1 in Italy, 254 in Hungary, 258.2 in Austria, 317.1 in Bavaria, and 329.5 in Wurtemburg. With regard to Bavaria, there is considerable difference in the infant death-rate in different districts. Thus in Suabia it reaches the enormous figure of 409 (nearly four times as great as that of Norway), and in Upper Bavaria it is 406, while in the Bavarian palatinate it is only 187. From these statistics it would appear that the hygiene of infancy is better understood in Norway than elsewhere, and that German nurslings are either particularly delicate or particularly unfortunate in the mode of their bringing up.

THE FATE OF CADAVERIC MICROBES.—It is a comfort to learn, on the authority of M. Esmarch, that most pathogenic microbes succumb sooner or later after their victims have died. Experiments were carried out with nine different micro-organisms, says the *Medical Press*, and the bodies of the animals on which they had wreaked their wicked will were either buried or kept under water, or exposed to the air. The bacillus of septicæmia survived ninety days, while that of anthrax disappeared within a week. The bacillus of fowl cholera was seldom found after three weeks, but the tubercular microbe did not lose its virulence until 204 and 252 days had elapsed. All trace of the other organisms was lost in from three days to a week, including those of typhoid-fever, Asiatic cholera, and tetanus. As a general rule, the more active the decomposition, the sooner did they perish, and this is another argument in favor of "earth-to-earth" burial, pending the universal adoption of cremation.

RECENT SAVING OF LIFE IN MICHIGAN. — In a carefully prepared paper read before the Sanitary Convention at Vicksburg, the proceedings of which are just published, Dr. Baker gave official statistics and evidence which he summarized as follows: "The record of the great saving of human life and health in Michigan in recent years is one to which, it seems to me, the State and local boards of health in Michigan can justly 'point with pride.' It is a record of the saving of over one hundred lives per year from small-pox, four hundred lives per year saved from death by scarlet-fever, and nearly six hundred lives per year saved from death by diphtheria, — an aggregate of eleven hundred lives per year, or three lives per day, saved from these three diseases. This is a record which we ask to have examined, and which we are willing to have compared with that of the man who 'made two blades of grass grow where only one grew before.'"

GASTRIC JUICE AS A GERMICIDE.—Drs. Straus and Wurtz have conducted a series of experiments in order to ascertain the action of the gastric juice on the bacilli of tubercle, charbon, typhoid, and cholera-morbus. The gastric juice from man, dogs, and sheep was selected for the experiments. It was found, as stated in the *British Medical Journal*, that digestion for a few hours at a temperature of 100° F. destroyed all the germs. The bacillus anthracis was killed in half an hour, the bacillus of typhoid and cholera in under three hours, while the bacillus of tubercle bore digestion for six hours, under which time it was still capable of provoking general tubercular infection. Even when digested for from eight to twelve hours, the

bacillus was still capable of producing a local tubercular abscess, not followed by general infection. Over twelve hours' digestion destroyed it completely. The germicide influence of gastric juice appears to be due to its acid contents, as it was found that hydrochloric acid alone, dissolved in water in the same proportion as it is in gastric juice, proved as active a destroyer of the bacilli. The pepsin appears to have no influence on the germs. Drs. Straus and Wurtz, who publish their researches in *Archives de Médecine Expérimentale*, wisely remind their readers that the germs, when protected by animal and vegetable tissues and introduced into the stomach in ordinary nutrition, are not exposed to so direct and prolonged action of the acid constituents of gastric juice as in these experiments.

BOOK-REVIEWS.

Electric Light Installations and the Management of Accumulators. By Sir DAVID SALOMONS. New York, Van Nostrand. 12°. $1.50.

As this is the fifth edition of a work which first appeared only two or three years ago, it is unnecessary to say that it fills a very important place in the literature of electrical science. It is not intended as a text-book on electric lighting, nor is it addressed to electricians as such; but it covers a field of its own, which had been previously neglected, or, rather, a field which had not been as alluring to writers on the subject as had other departments of the science.

Though the author disclaims any pretence to literary style, his work proves that he possesses in a high degree the three essential requisites of a successful writer; namely, to have something interesting to say, to be able to say it so that it may not be misunderstood, and to stop when he has said it. As a result, he has given us a plain statement of facts in regard to the practical side of electric lighting and the management of accumulators, attractively and clearly presented, and in as concise a manner as is consistent with the nature of the subject. The author proceeds on the assumption that the reader has a general knowledge of electric lighting, omitting minor details, which may best be found in any elementary book on the applications of electricity.

To those familiar with the work in its previous editions, it may be well to mention that this edition has been carefully revised and greatly enlarged, besides which many new engravings have been introduced, rendering the text more intelligible and at the same time showing the various types of electrical apparatus adopted by different manufacturers. To those who have never read the book, its scope may best be gathered from the author's statement that previous to its appearance no book had been written on the special subject of the management of the accumulator. Of the two classes of persons most directly interested in the secondary battery, manufacturers and purchasers, the former, as a rule, know comparatively little of its properties, their knowledge being confined mainly to laboratory tests. The true knowledge of how a battery will act is gained only by long experience. While it is in the hands of a non-professional user, rarely competent to examine the question for himself, this knowledge cannot be gained or turned to account. There are but few who have both the opportunity and the qualifications necessary to observe, scientifically as well as practically, the working of an accumulator, and fewer still with time, opportunity, and inclination to write upon the subject. To fill this gap, between the manufacturer and the general user, the author has attempted; and the demand for the present work proves that his attempt has met with a full measure of success.

The book is divided into two parts, the first treating of cells and their mode of employment; the accumulator house; charging and discharging; and failures, with their causes and remedies. The second part is devoted to installation work and practice, treating of engines, dynamos, and motors; switchboards, switches, instruments, lamps, and wiring; rules for the prevention of fire risks; action of cells with dynamo; methods of working and governing; alternating currents, testing, and estimating, etc.; ending with a description and history of the author's own private installation of secondary batteries at Broomhill. The book is fully illustrated, and provided with a very complete index.

A Text-Book on Roofs and Bridges. Part II. Graphic Statics. By MANSFIELD MERRIMAN and HENRY S. JACOBY. New York, Wiley. 8°. $2.50.

THIS volume, as its name indicates, is a treatise on graphic statics as applied to the discussion of common roofs and bridges. It is an outgrowth of the course of instruction in the subjects named, given to the students of civil engineering in Lehigh University, in which institution the authors are respectively professor of and instructor in that branch of applied science. The course in civil engineering in the university mentioned consists of four parts; namely, the computation of stresses in roof-trusses and in all the common styles of simple bridge-trusses; the analysis of stresses by graphic methods; the design of a bridge, including the proportioning of details and the preparation of working drawings; and the discussion of cantilever, suspension, continuous, and arched bridges. In this volume the second part of this course is presented, together with much additional matter.

Being offered as an elementary text-book, we need not look for many novelties in the work aside from the method of arrangement and presentation, though we may call attention to the abbreviated processes employed in some of the diagrams for wind-stresses, to the determination of stresses due to initial tension, and to portions of the analysis of maximum moments and shearing strains under locomotive wheel loads, as possessing some points of novelty as well as of practical value.

For the convenience of students, blank leaves are provided, alternating with the printed pages, upon which to record the numerical computations necessary in the preparation of graphical analyses, and upon which to make sketches of the stress diagrams required in the problems. The book is divided into three main parts, treating respectively of general principles and methods, of roof-trusses, and of bridge-trusses. An appendix contains the answers to the problems. The work is written in a clear and attractive style, and, though intended mainly as a text-book for students, it is not without value to engineers and others.

Elements of Logic as a Science of Propositions. By E. E. CONSTANCE JONES. Edinburgh, T. & T. Clark. 8°. $3.

THIS book is a very ambitious, but, as it seems to us, very unsuccessful, attempt to reconstruct the science of logic. The author takes the ground that logic is an objective science, and not a branch of psychology, and then goes on to define it as "the science of the import and relations of propositions," denying altogether that it is a science of reasoning or of the laws of thought. The chief characteristic of the treatise, however, is not the view taken of the science, nor any new or startling theory of its fundamental principles, but the employment of an immense number of new-fangled terms in place of the familiar ones that have been in use for centuries. What the object of such an innovation may be, unless to give the work an air of originality, we do not know; for we fail to see in what respect the new nomenclature is an improvement on the old. Thus, we cannot see the propriety of calling existence "quantitiveness," nor of using the phrase "subject of attributes" instead of the familiar term "substance." Essential attributes are termed by the author "intrinsic," and accidental ones "extrinsic;" an absolute attribute is called "independent," and a relative one "dependent;" hypothetical propositions are "inferential," and disjunctive ones "alternative;" and so on throughout the book, till the reader who looked at the terminology only might almost fancy that he was studying a new science. Yet, apart from this strange terminology, we fail to find in the work any thing specially new or noteworthy, while in some passages there is evidence of much confusion of thought. This is specially apparent in

the chapter on abstraction and conception, and also in many cases in the use of the new terminology. Those who wish for novelty in a scientific work may be interested in this one; but most people, we think, will prefer to walk in the old ways.

AMONG THE PUBLISHERS.

IN *The Jenness-Miller Magazine* for March is an article on "Physical Culture," by Mabel Jenness, and another on "The Luxury of the Turkish and Roman Baths," by Annie Jenness-Miller.

—The issue of London *Engineering* for Feb. 28 is devoted mainly to an exhaustive and handsomely illustrated article on the recently completed bridge across the Firth of Forth in Scotland. Including advertisements and inserted plates, the number contains 268 pages. It is as notable a work in its way as the bridge it treats of.

—The *Home Journal*, which was founded in 1846 by George P. Morris and N. P. Willis, preserved its original form, four very large pages, until a few weeks ago, when it assumed the more modern form of eight smaller pages. The journal has every appearance of increasing prosperity.

—"A Digest of English and American Literature" is now in the press of S. C. Griggs & Co. of Chicago, being the last work completed previous to the death of its author, Professor A. H. Welsh, whose "Development of English Literature and Language" has passed through ten editions.

—P. Blakiston, Son, & Co., Philadelphia, will publish about March 15 a new medical dictionary, by Georege M. Gould, A.B., M.D. It will be a compact one-volume book, containing several thousand new words and definitions collected from recent medical literature, while the total number of words is beyond that in any similar book. It includes also tables of the bacilli, leucomaines, ptomaines, micrococci, etc.; of the arteries, nerves, etc.; and of the mineral springs of the United States; together with other collateral information.

—*Poet-Lore* for March 15 will give another of Mr. Nathan Haskell Dole's papers on the Russian drama, with translations from Tolstoi and Pushkin. Mr. W. G. Kingsland, a friend of Browning's, whose recollections of him date for twenty years past, will give some personal memoranda. Among other incidents, the origin of Browning's poem "Memorabilia" is told. The first of a series of selected specimens of Anglo-Saxon poetry, literally translated, by Anna Robertson Brown of Wellesley and Oxford, will be begun. The first selection is from Beowulf. Mr. J. S. Stuart Glennie's opinion of Shakspeare's attitude on the land question, as given in the January *Poet-Lore*, has called out a letter from a special student of Shakspearian records, Mr. A. Hall of London, which will be among the minor matters of the magazine for March.

—The directors of the "Old South Studies in History" have just added to their general series of "Old South Leaflets," published by D. C. Heath & Co., a translation of the Constitution of Switzerland, by Professor Albert B. Hart of Harvard University, with historical and bibliographical notes. It will be of use to those both inside and outside of our colleges who are engaged in the comparative study of politics. Equally interesting to many, at a time when several new States in the Union are just adopting constitutions, will be the Constitution of Ohio, which has also recently been added to this series of leaflets. It is the purpose of the directors of the "Old South Studies" to follow up these with several similar leaflets, enabling every student to possess for a few cents good copies of the constitutions of leading European nations as well as of representative States in the Union. Our young people are very seldom familiar with the constitution of their own State. It is too often because they cannot easily get at it.

—A good figure of our native St. John's wort, which was discovered by the Swedish botanist Kalm at Niagara Falls, and named in honor of him *Hypericum Kalmianum*, is given in *Garden and Forest* for last week. Another illustration is of a giant African aloe, which would probably flourish in our Southern States, and make a superb garden-plant. Mr. F. W. Burbidge, curator of the Botanical Gardens of Dublin University, writes of the home of the pitcher-plants on the mountain slopes of Borneo; Mr. Charles C. Binney, secretary of the American Forestry Association, discusses the means of forest-reform; and Charles Eliot proposes a plan for saving the grand Waverly Oaks.

—A cable despatch calls attention to the space occupied in the March reviews by social and economical discussions. *The Nineteenth Century*, which keeps its lead, has the third of a series by Professor Huxley. In this one, entitled "Capital, the Mother of Labor," he once more attacks Mr. Henry George and his theories. Mr. J. D. Christie, who announces himself as a pastry-cook, contributes to the same review what he calls a "Workingman's Reply to Professor Huxley." Lord Bramwell writes on property. Perhaps Mr. Herbert Spencer's paper on justice may be referred to the same category, though it is, as usual, an *a priori* argument rather than a practical help toward any valid theory of political ethics. Similar topics are uppermost in *The Contemporary Review*, where M. de Laveleye discourses on communism, neatly applying the knife to some of its favorite dogmas; Mr. Fletcher Moulton argues for taxaton of ground rents; and Mr. Lyulph Stanley discusses free schools, — a social question that goes deeper than most others.

—David Starr Jordan, president of the University of Indiana, will open the April *Popular Science Monthly* with a vigorous article on "Science in the High School." Its object is to show up the make-believe character of what is offered in many schools to satisfy the modern demand for science-teaching. An article by Professor Huxley, entitled "On the Natural Inequality of Men," will be printed. It deals with Rousseau's idea of the equality of men in the state of nature, with applications to the recent controversy on the land question. The ladies are not yet through with Grant Allen's "Plain Words on the Woman Question." Another answer to Mr. Allen's article will appear in the same number by Miss Alice B. Tweedy, who asks, "Is education opposed to motherhood?" and answers the question with a vigorous negative. Professor C. H. Toy o Harvard will contribute a thoughtful essay on "Ethics and Religion," in which he shows that religions have mainly borrowed their rules of conduct from what men have regarded as right, and that it is doubtful if ethics has received any thing from religion.

—Messrs. Mudge & Son of Boston have issued a small work by Mary Boole, widow of George Boole, entitled "Logic taught by Love." It is not a connected treatise, but a series of detached essays which had previously appeared in various periodicals. Why it is called "Logic" we cannot see; for there is nothing in it about logic except a few quotations from Mr. Boole and one or two other writers. The greater part of the book is occupied by religious essays of a more or less mystical character, the writer's religious views being a queer compound of pantheism and Judaism. Her leading doctrine is that of "pulsation," which she expresses by saying that "the very life of all that lives consists of some mode or other of pulsation or alternate action;" and again she says that "sound thought is always essentially a free pulsation between extremes." She makes no attempt to prove this doctrine or even to explain it, but takes it for granted throughout the book; yet she does not draw from it any noticeable conclusions. In dealing with religious and educational themes she has some interesting remarks, though none that can be called original; and if she had avoided mysticism and kept within the bounds of common sense, she might have written something of real value.

—Messrs. Porter & Coates, Philadelphia, have just published "Essays of an Americanist, — I. Ethnologic and Archæologic, II. Mythology and Folk-Lore, III. Graphic Systems and Literature, IV. Linguistic," — by Daniel G. Brinton. This

valuable contribution to the study of the native American tribes, their history, antiquities, religion, and literature, by one of the best-known scholars in this branch, should be in the hands of every person interested in the subject, and on the shelves of every library. Among the questions discussed are, under Part I., the data for the study of the prehistoric chronology of America, palæoliths (American and other), the alleged Mongolian affinities of the American race, the probable nationality of the mound-builders of the Ohio valley, the Toltecs of Mexico and their fabulous empire; under Part II., the sacred names in the mythology of the Quiches of Guatemala, the hero-god of the Algonkins as a cheat and liar, the journey of the soul in Egyptian, Aryan, and American mythology, the sacred symbols of the Cross (the Svastika and the Triquetrum) in America, the modern folk-lore of the natives of Yucatan, the folk-lore of the modern Lenape Indians; under Part III., the phonetic elements in the hieroglyphs of the Mayas and Mexicans, the iconomatic method of phonetic writing used by the ancient Mexicans, the writing and records of the ancient Mayas of Yucatan, the books of Chilan Balam (the sacred volume of the modern Mayas), translation of the inscription on "The Stone of the Giants" at Orizaba, Mex., the poetry of the American Indians, with numerous examples; under Part IV., American aboriginal languages and why we should study them, Wilhelm von Humboldt's researches in American languages, some characteristics of American languages, the earliest form of human speech as revealed by American languages, the conception of love as expressed in some American languages, the lineal measures of the semi-civilized nations of Mexico and Central America, the curious hoax about the Taensa language. In Part IV. there is also an index of authors and authorities, and an index of subjects.

—Messrs. Longmans, Green, & Co. have issued "The Skipper in Arctic Seas," by Walter J. Clutterbuck, being an account of a voyage northward from Scotland toward Greenland and Jan Mayen Island, and culminating at Spitzbergen. The book is in many parts amusing, the events of the voyage being described in a humorous vein and in a pretty good style. The principal object of the trip was seal-shooting, though this was pursued, by the author of the book at least, as a pleasure rather than a business. Some account is given of the mode of hunting seals and of preparing their skins and fat for use. There are also occasional remarks on the climate, the birds, and the scenery, of a more or less interesting and instructive character. Still, we could wish there had been more of this kind of information, and less about the personal haps and mishaps of the author and his companions; and this not merely in the interest of science, but for the sake of readers generally. Travellers are too apt to think that the personal incidents o their trip are as interesting to their readers as to themselves; whereas what readers chiefly care for is the country visited, and not the personal affairs of the visitors.

— During 1889, R. W. Shufeldt contributed a series of articles to *The American Field* on the extinct mammals of the United States. These short sketches have now been reprinted in pamphlet form, and, as they are illustrated, one may gather from them some idea of the curious animals, now extinct, that once roamed over this country.

— In *Outing* for March are articles on "The Art of Boxing," by A. Austen; "The National Guard at Creedmoor," by Lieut. W. R. Hamilton; "The Waterloo Cup," by Hugh Dalziell; and "By-Ways near Natchez," "Hunting and Fishing in the Northwest," "The Yachting Outlook," "Our Home-Made Trip to Europe," and "Quail-Shooting in California."

— At the beginning of the ninth volume of *The Forum*, The Forum Publishing Company remind its friends of the following cardinal facts about its career and plan of conduct: "Advance is made in society, in politics, in religion, and in practical affairs, not by revolutionary methods, but it is helped by enlightened and candid discussion conducted within the limits of reverence and dignity. All safe leaders are conservative, because they know that human progress is achieved rather by evolution than by revolution. *The Forum*, therefore, being sincerely devoted to the advancement of sound and safe thinking, has never admitted to its pages advocates of revolutionary methods, but has sought to give its readers the benefit of the thought and experience of the safest guides. It is to this fact — that *The Forum* is always constructive and never destructive in its conduct — that its great success is attributed. The mass of the people who are in search of the truth, and who have not lost their bearings by reason of any of the wild theories of the time, have found in its conduct a constructive purpose in sympathy with their own ideas of progress; and *The Forum* has had the good fortune to draw to itself, for this reason more than for any other reason, the support of the great number of intelligent and conservative people in the country. The patronage that has kindly recognized this effort during the volume that is just completed has doubled the busi-

Publications received at Editor's Office,

Feb. 24–March 8.

AREY, A. L. Laboratory Manual of Experimental Physics. Syracuse, N.Y., C. W. Bardeen. 200 p. 16°. 75 cents.

BARKAN, L. How to preserve Health. New York, Exchange Pr. Co. 344 p. 12°.

BOOLE, Mary. Logic taught by Love. Boston, Alfred Mudge & Son. 177 p. 12°.

CENTURY Dictionary, The. An Encyclopedic Lexicon of the English Language. Prepared under the Superintendence of William Dwight Whitney, Ph.D., LL.D. Vol. II. New York, The Century Co. 1222 p. 4°.

CREMONA, L. Graphical Statics: Two Treatises on the Graphical Calculus and Reciprocal Figures in Graphical Statics. Tr. by Thomas Hudson Beare. Oxford, Clarendon Pr. 161 p. 8°. (New York, Macmillan, $2.25.)

ELLIS, J. Address to the Clergy, and Skepticism and Divine Revelation. New York, The Author. 260 p. 12°.

FRIESE, P. C. Semitic Philosophy: showing the Ultimate Social and Scientific Outcome of Original Christianity in its Conflict with Surviving Ancient Heathenism. Chicago, S. C. Griggs & Co. 247 p. 12°.

GEOLOGICAL and Natural History Survey of Canada, Annual Report of. Vol. III. Parts I. and II. Montreal, W. F. Brown & Co. Maps. 8°.

GODWIN, H. C. Railroad Engineers' Field-Book and Explorers' Guide. New York, Wiley. 358 p. 16°.

HOLMES, W. H. Textile Fabrics of Ancient Peru. Washington, Government. 17 p. 8°.

ILLINOIS State Board of Health, Tenth Annual Report of the. With an Appendix. Springfield, State. 313 p. 8°.

JONES, E. E. C. Elements of Logic as a Science of Propositions. New York, Scribner & Welford. 208 p. 8°. $3.

KNOFLACH, A. Sound-English: A Language for the World. New York, Stechert. 63 p. 12°. 25 cents

LELAND, L. A Woman's Journey around the World Alone. New York, Am. News Co. 358 p. 12°. 25 cents.

MACAULAY, T. Lays of Ancient Rome. (Riverside Literature Series, No 45.) Boston and New York, Houghton, Mifflin, & Co. 117 p. 16°. 15 cents.

OPEN Sesame! Poetry and Prose for School-Days. Ed. by Blanche Wilder Bellamy and Maud Wilder Goodwin. Boston, Ginn. 316 p. 12°. 90 cents.

PILLING, J. C. Bibliography of the Iroquoian Languages. Washington, Government. 208 p. 8°.

——Bibliography of the Muskhogean Languages. Washington, Government. 114 p. 8°.

SMITHSONIAN INSTITUTION, Fifth Annual Report of the Bureau of Ethnology to the Secretary of the, 1883–84. By J. W. Powell, director. Washington, Government. 564 p. 4°.

SWEDENBORG, E. Heaven and the World of Spirits, and Hell. New York, Swedenborg Pub. Society. 416 p. 24°. 14 cents.

THOMAS, C. The Circular, Square, and Octagonal Earthworks of Ohio. Washington, Government. 33 p. 8°.

——The Problem of the Ohio Mounds. Washington, Government. 54 p. 8°.

U.S. GEOLOGICAL SURVEY. Topographical Maps of Portions of Montana, Massachusetts, New Hampshire, Iowa, Virginia, Connecticut, Rhode Island, Alabama, North Carolina, South Carolina, Kentucky, Tennessee, Colorado, and West Virginia. Washington, Government. 28 maps. f°.

VON SACHS, J. History of Botany (1530–1860). Tr. by H. E. F. Garnsey. Oxford, Clarendon Pr. 568 p. 12°. (New York, Macmillan, $2.50.)

WAGNER, M. Die Entstehung der Arten durch räumliche Sonderung. Basel, Benno Schwabe. 667 p. 8°.

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ness of The Forum Publishing Company, and the magazine enters upon its ninth volume with a degree of prosperity that was not expected at so early a date.''

— *Garden and Forest* for March 27 contains a figure of the prairie rose of the South-west, from one of Mr. Faxon's best drawings, with a description of it by Mr. Sereno Watson; and an illustration of an alley of orange-trees in the Garden of the Tuilleries, with some notes on the planting of the open spaces in the city of Paris. In the same paper Professor Bailey discusses the principles of grafting, and Dr. George Thurber writes in his entertaining way of the so-called poisonous properties of the primrose, which has been a source of irritation to many gardeners. ''Garden Flowers in Midwinter,'' ''Fern Notes,'' and ''Botany for Young People,'' are the titles of a few more of the articles which help to make up an attractive and useful number.

— In the March number of the *Political Science Quarterly*, Professor Anson D. Morse of Amherst College examines the political theories of Alexander Hamilton; Professor Edwin Seligman of Columbia College traces the history of the general property tax in Europe and in the United States, and shows why all attempts to reach personal property have failed; J. P. Dunn, jun., Indiana State librarian, writes strongly on ''The Mortgage Evil in the West;'' Professor Simon N. Patten of the University of Pennsylvania criticises David A. Wells's ''Recent Economic Changes;'' Irving B. Richman discusses United States citizenship; and Professor Frank J. Goodnow of Columbia College completes his description of the new Prussian system of local government, in which the ideas of Stein have obtained complete expression. The number also contains reviews of more than twenty recent political, economic, and legal publications.

— We glean the following notes from the *Publishers' Weekly*: Prince Jerome Napoleon is busily engaged in preparing his memoirs of the Second Empire. Mrs. Humphry Ward's new novel, dealing with the experiences of a successful mechanic who tries many kinds of life and phases of thought, and who finally joins the Elsmere brotherhood, is ready for the publisher. At the time of his death, a few weeks ago, Peter Henderson, the well-known seedsman, had just completed a new edition of his ''Handbook of Plants and General Horticulture.'' The preface which he wrote is dated in January last. This edition contains a great deal of new information, and will make still more useful a work which has already become a standard. *The Writer*, post-office box 1905, Boston, Mass., has in preparation a ''Directory of American Writers, Editors, and Publishers.'' Chatto & Windus have in press the first two volumes of Justin Huntly McCarthy's ''History of the French Revolution.'' It is to be in four volumes, and will be published uniform with his father's ''History of the Four Georges.'' Bellamy's ''Looking Backward'' passed 301,000 copies last month, and the demand is reported to have been over 1000 a day. It is estimated that of the foreign pirated editions, about 50,000 copies have been sold in England. France comes next, followed by Germany and Denmark. The Catholic Publication Society Company will soon publish in pamphlet form ''Who was Bruno? A Direct Answer to a Plain Question, from the Latest Published Documents,'' by Mr. John A. Mooney. It is the first book published in this country giving the Catholic side of the Bruno affair. E. P. Dutton & Co. will publish at once ''To Europe on a Stretcher,'' an account of an invalid's travels, by Mrs. Clarkson Potter. T. Y. Crowell & Co. announce ''Recollections of a Private,'' by Warren Lee Goss, the author of ''Jed.'' Part of these recollections have already appeared in the *Century Magazine*. A. C. Armstrong & Son will publish a book by Professor T. W. Hunt of Princeton College, entitled ''Studies in Literature and Style.'' Harper & Brothers have in press ''Two Years in the French West Indies,'' containing the literary results of a voyage by Lafcadio Hearn, the author of ''Chita.'' The introductory chapter, entitled ''A Midsummer Trip to the Tropics,'' consists of notes taken on a voyage of nearly three thousand miles, and the remainder of the book is devoted to sketches of life on the island of Martinique, describing the manners, customs, and characteristic types of the island. An appendix to the volume gives some Creole melodies. The book is illustrated. The Cassell Publishing Company have just ready ''Australian Poets, 1788–1888,'' being a selection of poems upon all subjects written in Australia and New Zealand during the first century of the British colonization, with brief notes on their authors and an introduction by Patchett Martin, edited by Douglas B. W. Sladen of Melbourne, Australia; and ''Star-Land,'' by Sir Robert S. Ball, based on notes and recollections of the lectures delivered to children at the Royal Institution of Great Britain in 1881 and 1887, which makes a readable book on astronomy for young people.

LETTERS TO THE EDITOR.

Supposed Aboriginal Fish-Weirs in Naaman's Creek, near Claymont, Del.

IN reply to the letters of Messrs. Haynes and Peet in your issue of Feb. 28, I have to say that it is evident that Professor Haynes was misled by the version of my letter published in the *American Antiquarian* of November, 1887 (vol. ix. No. 6) and did not receive my letter suggesting that the remains in question were fish-weirs until too late for use in his work executed for ''The Narrative and Critical History of America.'' It seems to me, however, that I might have received an earlier notice of the contemplated work; but, as the reason why is given by Professor Haynes, we will let the matter rest there. A footnote in my letter to *Science*, published Feb. 14, 1890, p. 117, explains why the term ''station'' was used. It does not seem to me that the term ''pile-structures'' ought to suggest ''pile-dwellings.'' The term ''pile-structures'' was adopted at Professor Putnam's suggestion, as we deemed it best to designate them in this way until investigations upon the spot were finished. ''Stake-ends,'' ''log-ends,'' or ''post-ends'' would have served equally well for the same purpose.

In answer to Mr. Peet's remarks, I desire to say that I have no intention of withdrawing from my position hitherto taken, and call upon him to prove that I ever wrote any such letter as that which is the subject of this interchange of civilities. It is evident that the comparison which he makes in *Science* of Feb. 28, 1890, is but a reversion to the account already disapproved by me, and denounced as erroneous.

I desire here to make a correction in my last letter to *Science*, published Feb. 14, 1890; viz., on p. 116, second column, sixth line from the bottom, ''(1877)'' should read ''(1887)''.

HILBORNE T. CRESSON.

Philadelphia, March 1.

The June Drought in the Rocky Mountain Region.

IN your notice of the meteorological observations on Pike's Peak, in *Science* for Feb. 21, are the folowing statements:—

''A very decided secondary minimum [of precipitation] occurs in June. . . . The June minimum appears very remarkable, but its authenticity seems assured in view of the fact that at Colorado Springs, at the base of the mountain, and at Denver, nearly 80 miles to the northward, similar rainfall conditions obtain.''

The occurrence of a minimum of precipitation during June can be affirmed not only of the country near Pike's Peak, but also of a large part of the Rocky Mountain region, also of the Great Plains and the Great Basin. It is one of the most constant meteorological epochs of the region in question. It marks a decided change in the character of the storms. During April and May most of the precipitation falls from stratus or cumulo-stratus clouds being driven up the slopes of the plains and mountains, and such storms often cover a large part of Colorado simultaneously. These storms end in late May or early June as cold rains or with hail and snow on the mountains. From the 6th to the 10th of June there is usually a frost among the foot-hills, and this sometimes descends on to the plains to 5,000 feet or even lower. Then for some weeks the general temperature is cool and delightful, gradually rising till early in July, when the summer storms begin. These are local thunder-storms of the ordinary type.

It is well known that over the plains in Colorado crops are now being raised without irrigation in places where this was formerly supposed impossible. This is in large part due to the adoption of improved methods of cultivation specially adapted to the climatic conditions. The farmer early observed the dry weather of June, and came to expect it as a rule. On these plains successful agriculture was possible only after a careful study of the June drought. At the present time the aim is to have the times of planting so fixed that at the time of this drought each crop shall be at that stage of its growth in which experience shows it can best endure the dry weather.

G. H. STONE.

Colorado Springs, March 5.

The Fiske Range-Finder.

WITH reference to the very interesting suggestion of Mr. J. F. Dennison concerning my range-finder, which appeared in your issue of Feb. 28, I can only say that the plan which he suggests has been the subject of much thought on my part, and has been sketched out in many modified forms. The only objection to it is the very commonplace, but very potent one, that the end attained is hardly worth the apparatus required. Some person must be at hand to read the distances indicated, and he can very easily move the contacts himself. As a general principle, I think it is agreed that mechanism should never be introduced where it can be avoided, for mechanism is liable to disarrangement; and simplicity should, it seems to me, be the aim of all invention.

BRADLEY A. FISKE, U.S.N.

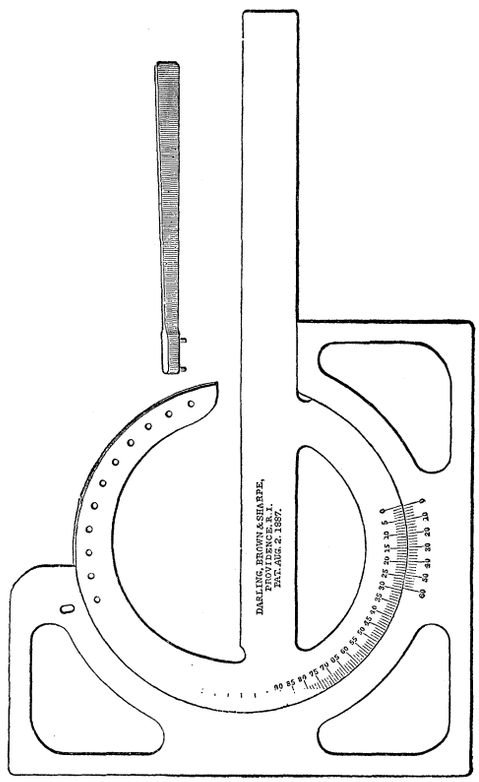
New York, March 5.

INDUSTRIAL NOTES.

A New Draughtsman's Protractor.

THE protractor shown in the accompanying cut is made from one-sixteenth inch sheet steel, and is light and durable. The length of the blade is eight inches and a half. The graduations read to degrees, and the vernier reads to two minutes. This protractor is chiefly used in connection with a T-square or straight-edge. It can be quickly and accurately set by hand to any angle. A lever is, however, provided as of possible advantage in obtaining very fine settings.

There are no projections on either face of the instrument, and consequently it can be used on either edge of the blade or either side up. This makes it particularly convenient in dividing circles, transferring angles, drawing oblique lines at right angles to each other, or laying off given angles on each side of a vertical or horizontal line without changing the setting. For laying out tapers and dividing circles and laying out geometrical figures, tables are furnished with the instrument, which give the settings that are necessary. In many instances the protractor takes the place of the ordinary 45-degree and 60-degree triangles, and it is also used as an extension to the T-square when the work is beyond the end of the blade of the square. It is made by Darling, Brown, and Sharpe, manufacturers of fine tools, of Providence, R.I.



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